

REMARKS

Applicants have considered the Office Action dated November 24, 2008, and the reference cited therein. Claims 1-10 are pending. Independent **claims 1, 7 and 8** are rejected as either anticipated or obvious over Cushman et al. US Pat. No. 3,779,070 (Cushman). **Claims 2-6, 9 and 10** are objected to as depending from a rejected base claim, but would be allowable if re-written in independent form including the limitations of the base claim (and any intervening claims).

Applicants note with appreciation the recognition of allowable subject matter in the dependent claims. Applicants have amended the rejected independent claims (and the dependent claims where needed for the sake of consistency) to make clear that the present invention is based upon measurements of *reflections of a signal beam by particles suspended within a liquid* into which the signal beam is directed. In contrast, Cushman describes a measurement system and method that is based on measuring *attenuation* of a beam that passes through a liquid containing suspended particles. Nowhere does Cushman disclose measuring particle size distribution based on *particle reflection measurements*. For at least this reason the presently claimed invention is neither anticipated nor rendered obvious by Cushman.

Applicants request favorable reconsideration of the Office Action's grounds for rejecting claims 1, 7 and 8 in view of Applicants' amendments to the previously pending claim and the Remarks provided herein below. Please charge any fee deficiencies to Deposit Account No. 12-1216.

The Rejection of Claims 1, 7 and 8 As Anticipated/Obvious In View of Cushman

Applicants traverse the rejection of **claims 1 and 7** as being anticipated by Cushman since the teachings contained therein would not have disclosed each and every recited element to one skilled in the art at the time of the invention. Applicants' claimed invention is directed to a method for measuring particle size distribution within a liquid through the processing of signals *reflected* by the particles within the liquid. In accordance with claim 1, a series of particle reflection measurements are taken of a signal beam reflected by a particle contained within a liquid. The measurements of the reflected signal beam by suspended particles are thereafter used to render a maximum likelihood estimation of the parameters describing a

distribution of particle size in the liquid wherein the estimation takes into account a probability that a strong reflection will mask a weak reflection.

In contrast, Cushman discloses measuring particles suspended in a liquid by processing signals transmitted *through* a liquid. In one embodiment, a transmitter and receiver are placed on opposing sides of a vessel containing the liquid under consideration. In an alternative embodiment, shown in FIG. 39 (referenced by the Office Action), the transmitter and receiver are placed on a same side of the vessel and a mirror is positioned on a side opposite the transmitter and receiver. In the alternative embodiment, the transmitted signal passes through the liquid (containing particles) a first time, is reflected on the opposite side by the mirror, passes through the liquid a second time, and the attenuated signal is then sensed by the receiver. In both embodiments, the system measures the *attenuation of the transmitted signal*. Indeed, Cushman refers to the alternative embodiment (FIG. 39) as a means for obtaining the same result as the other attenuation measurement assemblies that place the transmitter and receiver on opposite sides of a vessel containing a liquid to be measured.

Accordingly, Cushman unequivocally describes a correction of measured *attenuation* of a transmitted signal by particles suspended in a liquid. *See*, Cushman, Col. 8, lines 1-15. The effect of shadowing in Cushman's system and method is that a signal does not reach shadowed particles so that the shadowed particles do not contribute to attenuation of the signal. Shadowing thus reduces the total number of particles measured per unit volume in Cushman's signal attenuation-based system. Cushman (see, Eq. 5) accounts for shadowing with a factor " $n-n_{sh}$ ", i.e., the number " n " of particles per unit volume, minus the number " n_{sh} " of shadowed particles.

Applicants' claimed invention, which is based upon measurement of *particle reflection* measurements, is neither disclosed nor suggested by Cushman. The claimed invention, in contrast to compensating for shadowing by particles (Cushman), addresses the phenomenon of strong reflections (from large particles) masking weaker reflections (from smaller particles) from a liquid containing suspended particles of various sizes by performing the recited "maximum likelihood estimation of the parameters" step.

Thus, one skilled in the art at the time of the invention would have understood Cushman as being directed to addressing the phenomenon of "shadowing" during measurements of attenuation of a signal transmitted through a liquid. Compensating for shadowing does not disclose or suggest Applicants' claimed method which seeks to apply a probability that a stronger *reflection* will mask a weaker *reflection* by a particle within the liquid under observation. Furthermore, one skilled in the art, when addressing signal *reflections by particles within a liquid* would not be motivated to consult Cushman's teachings which are directed to measuring *attenuation* of transmissions through a liquid.

Finally, one skilled in the art would understand Cushman to disclose changing a number of particles to account for "shadowed" particles that do not contribute to attenuation of a transmitted signal. Cushman would not be understood to account for relatively weak reflections by particles that are masked by stronger particle reflections (as recited in the claims). In fact, Cushman describes particles that do not even produce a reflection since they are "shadowed" by another particle. For at least this further reason, the claimed invention is not anticipated by Cushman.

Applicants furthermore traverse the rejection of **claim 8** as being obvious over Cushman for at least the reasons stated herein above regarding the rejection of claims 1 and 7.

Conclusion

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



Mark Joy, Reg. No. 35,562
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

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